| | L # | Hits | Search Text | DBs | Time Stamp |
|---|---|---|---|---|---|
| 1 | L1 | 22800 | temperature or temp)near3(coefficient or co adj efficient | USPAT | 2002/04/22 09:59 |
| 2 | L2 | 503 | 1 with(conductivity or conductance) | USPAT | 2002/04/22 09:59 |
| 3 | L3 | 242 | 2 and(sensor or detector or sensing or detecting or detection or detect) | USPAT | 2002/04/22 10:00 |
| 4 | L4 | 2712 | 1 same(temp or temperature) with(compensate or compensating or compensation) | USPAT | 2002/04/22 09:51 |
| 5 | L5 | 43 | 3 and 4 | USPAT | 2002/04/22 09:56 |
| 6 | L6 | 5 | 3 and 422/50-104.ccls. | USPAT | 2002/04/22 09:57 |
| 7 | L7 | 6 | 3 and 436/1-183.ccls. | USPAT | 2002/04/22 09:58 |
| 8 | L8 | 11565 | temperature or temp)near3(coefficient or co adj efficient | DERWENT | 2002/04/22 09:59 |
| 9 | L9 | 228 | 8 with(conductivity or conductance) | DERWENT | 2002/04/22 10:00 |
| 10 | L10 | 41 | 9 and(sensor or detector or sensing or detecting or detection or detect) | DERWENT | 2002/04/22 10:06 |
| 11 | L11 | 1 | 4849133.pn. | USPAT | 2002/04/22 10:39 |
| 12 | L12 | 26295 | sno2 or sno adj sub or tin adj(oxide or dioxide) | USPAT | 2002/04/22 10:41 |
| 13 | L13 | 493 | 1 and 12 | USPAT | 2002/04/22 10:42 |
| 14 | L14 | 5020 | 1 same(negative or n near type) | USPAT | 2002/04/22 10:55 |
| 15 | L15 | 93 | 13 and 14 | USPAT | 2002/04/22 10:43 |
| 16 | L16 | 6297 | 1 same(positive or p near type) | USPAT | 2002/04/22 10:56 |
| 17 | L17 | 109 | 13 and 16 | USPAT | 2002/04/22 10:56 |
| 18 | L18 | 62 | 17 not 15 | USPAT | 2002/04/22 10:56 |

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=> d his

     (FILE 'HOME' ENTERED AT 13:31:06 ON 22 APR 2002)
     FILE 'REGISTRY' ENTERED AT 13:31:23 ON 22 APR 2002
L1  23189 S (ANILINE OR PYRROLE OR THIOPHENE OR ACETYLENE OR METHYLPYRROLE OR
          ETHYLENEDIOXYTHIOPHENE OR METHYLTHIOPHENE) AND (POLYMER OR
          HOMOPOLYMER)
     FILE 'CA' ENTERED AT 13:37:38 ON 22 APR 2002
L2  58809 S L1
L3  24732 S CONDUCTI?(3A)POLYMER
L4  34145 S(POLY OR POLYMER)(4A)(THIOPHENE OR METHYLTHIOPHENE OR ACETYLENE OR
          ETHYLENEDIOXYTHIOPHENE OR EDOT OR PYRROLE OR ANILINE)OR POLYEDOT OR
          POLYETHYLENEDIOXYTHIOPHENE OR POLYMETHYLTHIOPHENE OR POLYTHIOPHENE OR
          POLYPYRROLE OR POLYANILINE OR POLYACETYLENE
L5  81843 S L2-4
L6  10603 S L5 AND COMPOSIT?(4A)(POLY? OR MATERIAL)
L7   1765 S L6 AND(GRAPHITE OR CARBON BLACK)
L8    630 S (ELECTROACTIV? OR ELECTRICAL?(1A)CONDUCT?)AND L7
L9      9 S L8 AND(SENSOR OR DETECTOR OR SENSING OR DETECTING)
L10  2538 S L5 AND(SENSOR OR DETECTOR OR SENSING OR DETECTING)
L11   152 S L10 AND(NOSE OR SMELL OR AROMA OR ODOR)
L12   807 S L10 AND(CARBON BLACK OR GRAPHITE OR SILVER OR GOLD OR PLATINUM OR
          COPPER OR ALLOY OR CHARGE TRANSFER COMPLEX OR SUPERCONDUCTOR OR
          SEMICONDUCTOR)
L13   143 S (ELECTROACTIV? OR ELECTRICAL?(1A)CONDUCT?)AND L12
L14   388 S (L2 OR L3 OR L4)(6A)(MODIF? OR COMBIN? OR INCORPORAT?)(6A)(CARBON
          BLACK OR GRAPHITE OR SILVER OR GOLD OR PLATINUM OR COPPER OR ALLOY OR
          CHARGE TRANSFER COMPLEX OR SUPERCONDUCTOR OR SEMICONDUCTOR)
L15    38 S L14 AND L10
L16   322 S L9,L11,L13,L15
L17   185 S L16 NOT PY>1998
L18    47 S L16 NOT L17 AND PATENT/DT
L19   232 S L17-18

=> d l19 bib,ab 1-232

L20  ANSWER 35 OF 232  CA  COPYRIGHT 2002 ACS
AN   131:52689  CA
TI   Sensor systems for gas and odor analysis: Improvements by combining several
     transducer principles
AU   Mitrovics, Jan; Ulmer, Heiko; Weimar, Udo; Gopel, Wolfgang
CS   Institute of Physical and Theoretical Chemistry; Center of Interface,
     University of Tubingen, Tubingen, D-72076, Germany
SO   Eurosensors XII, Proceedings of the 12th European Conference on Solid-State
     Transducers and the 9th UK Conference on Sensors and Their Applications,
     Southampton, UK, Sept. 13-16, 1998 (1998), Volume 1, 602-605.  Editor(s):
     White, N. M. Publisher: Institute of Physics Publishing, Bristol, UK.
AB   The characterization of complex gas mixts. and odors requires the detn. of
     independent chem. features.  The simplest approach uses one transducer
     principle (such as conductivities monitored with metal oxides or polymers,
     mass changes monitored with polymers etc.) and evaluates arrays made of
     different materials.  Selectivities, however, of such arrays are limited. A
     principle problem concerns the choice of the materials suitable for certain
     transducers.  Metal oxides tend to monitor preferentially low mol. wt.
     mols. which can be reduced chem., polymers tend to monitor chem. similar
     org. volatiles, etc.  Therefore modular sensor systems (in this case contg.
     individual modules for eight cond. sensors and eight polymer sensors) have
     a principle advantage.  To illustrate the gain in performance by using a
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hybrid system the discrimination of a homologous series of aldehydes in an oil matrix is shown.

L20 ANSWER 38 OF 232 CA COPYRIGHT 2002 ACS
AN 130:339796 CA
TI Rapid differentiation of microbial cultures in liquid media using an electronic **nose**
AU Heron, S. T.; Gibson, T. D.
CS School of Biochemistry and Molecular Biology, University of Leeds, Leeds, LS2 9JT, UK
SO Eurosensors XII, Proc. 12th Eur. Conf. Solid-State Transducers 9th UK Conf. Sens. Their Appl. (1998), Volume 2, 813-816. Editor(s): White, N. M. Publisher: Institute of Physics Publishing, Bristol, UK.
AB The rapid differentiation of bacteria grown in a liq. media was achieved using an electronic **nose** contg. a **conducting polymer sensor** array. The differential ability of the electronic **nose** was compared between the headspace of micro-organisms grown in nutrient broth and on nutrient agar plates. Initial results suggest that microbial differentiation is not improved by using liq. media headspace.

L20 ANSWER 42 OF 232 CA COPYRIGHT 2002 ACS
AN 130:261240 CA
TI **Sensor** for **detecting** organic solvent gases and basic gases
IN Kita, Junichi; Okubo, Kunihiko; Yoshii, Mitsuyoshi; Aoyama, Yoshihiro; Kuyama, Hiroki; Yoshino, Katsumi
PA Shimadzu Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
PI JP 11094784 A2 19990409 JP 1997-275313 19970922
AB The title **sensor** comprises a gas-**sensing** film which is made from a mixt. contg. **elec. conductive** microparticles (e.g., **carbon black**) and a low-**cond. conductive polymer** (e.g., **polythiophenes**) doped by a small amt. of a dopant. The **sensing** film is formed between the pair of electrodes on an insulating substrate, in which changes in the resistivity of the **sensing** film are monitored as a gas to be detected deposits on the **sensing** film.

L20 ANSWER 47 OF 232 CA COPYRIGHT 2002 ACS
AN 130:138530 CA
TI Measurement of the responses to different **odor** intensities of "boar taint" using a sensory panel and an electronic **nose**
AU Annor-Frempong, I. E.; Nute, G. R.; Wood, J. D.; Whittington, F. W.; West, A.
CS Division of Food Animal Science, School of Veterinary Science, University of Bristol, Bristol, BS40 5DU, UK
SO Meat Sci. (1998), 50(2), 139-151
AB This study explored the possibility of using an electronic **nose** (e-**nose**) with a 12-**conducting-polymer sensor** array combined with pattern recognition routines to discriminate between varying intensities of boar taint. A set of samples in a model system comprising a neutral lipid base contg. varying combinations of androstenone and skatole were tested, as were pork fat samples. The e-**nose** responses for pork fat were calibrated against those given by a trained 10-member sensory panel for abnormal **odor** of the same samples from a total of 60 Large White cross-bred pigs. The e-**nose** responses related strongly to those of the sensory panel with a significant ($p < 0.01$) canonical correlation of 0.78. The data set was used to develop a discriminant function for grouping pork samples into three "response classes": normal, doubtful and abnormal. Based on this, the e-**nose** identified all the abnormal samples correctly. However, 16 % of the normal samples were also classified as abnormal. It was concluded that, in

general, the electronic **nose** can discriminate between different levels of boar taint and that although a high specificity of **sensors** to androstenone and skatole may be desirable it may not be entirely important to the development and configuration of a boar taint **sensor** array.

L20 ANSWER 49 OF 232 CA COPYRIGHT 2002 ACS
AN 130:123971 CA
TI A taste **sensor**
AU Toko, Kiyoshi
CS Department of Electronic Device Engineering, Graduate School of Information Science and Electrical Engineering, Kyushu University, Fukuoka, 812-8581, Japan
SO Meas. Sci. Technol. (1998), 9(12), 1919-1936
AB A review with 62 refs. A multichannel taste **sensor**, namely an electronic tongue, with global selectivity is composed of several kinds of lipid/polymer membranes for transforming information about substances producing taste into elec. signals, which are input to a computer. The **sensor** output exhibits different patterns for chem. substances which have different taste qualities such as saltiness, sourness and bitterness, whereas it exhibits similar patterns for chem. substances with similar tastes. The **sensor** responds to the taste itself, as can be understood from the fact that taste interactions such as the suppression effect, which appears for mixts. of sweet and bitter substances, can be reproduced well. The suppression of the bitterness of quinine and a drug substance by sucrose can be quantified. Amino acids can be classified into several groups according to their own tastes on the basis of **sensor** outputs. The tastes of foods such as beer, coffee, mineral water, milk, sake, rice, soybean paste and vegetables can be discussed quant. using the taste **sensor**, which provides the objective scale for human sensory expression. The flavor of a wine is also discriminated using taste-**odor** sensory fusion conducted by combining the taste **sensor** and an **odor-sensor** array using **conducting polymer** elements. The taste **sensor** can also be applied to measurements of water pollution. Miniaturization of the taste **sensor** using FET produces the same characteristics as those of the above taste **sensor** by measuring the gate-source voltage. Use of the taste **sensor** will lead to a new era of food and environmental sciences.

L20 ANSWER 50 OF 232 CA COPYRIGHT 2002 ACS
AN 130:85749 CA
TI Use of an electronic **nose** to detect tainting compounds in raw and treated potable water
AU Stuetz, R. M.; White, M.; Fenner, R. A.
CS Water Engineering Research Group, University of Hertfordshire, Hatfield, AL10 9AB, UK
SO Aqua (Oxford) (1998), 47(5), 223-228
AB An electronic **nose** incorporating 12 **polypyrrole conducting polymer sensors** was used to detect tainting compds. in supply waters. Raw and treated water samples were tainted with geosmin, methylisoborneol, 2-chlorophenol, phenol, diesel fuel, and 2-chloro-6-methylphenol at various concns. Multiple discriminant anal. showed that no overlapping occurred between any of the tainted and untainted samples and that the taint concns. were sepd. into distinct clusters. Close grouping between repeated tests also indicated that the **sensor** responses were reproducible. The clear sepn. of the tainted and untainted water samples demonstrated that the nonspecific **sensor** array can distinguish between clean water and water that contains trace levels of org. pollutants. This suggests that tainting compds., and therefore changes to the tastes and **odors** of the water, could be detected by monitoring the headspace gas of a water supply.

L20 ANSWER 51 OF 232 CA COPYRIGHT 2002 ACS
AN 130:73546 CA
TI Thin films of **electroactive** oligomers and polymers: application in **sensors** for volatile organic compounds and in light-emitting devices
AU Macdiarmid, A. G.; Zhang, W. J.; Feng, J.; Huang, F.; Hsieh, B. R.
CS University of Pennsylvania, USA
SO Annu. Tech. Conf. - Soc. Plast. Eng. (1998), 56th(Vol. 2), 1330-1334
AB Thin films of the doped (protonated) octamer of aniline one serve as excellent, rapid, reversible, environmentally stable **sensors** for org. vapors such as toluene admixed with air. Evidence is presented showing the dependency of the behavior of the LED's, Al/MEH-PPV/ITO and Al/MEH-PPV/EB/ITO (EB = the emeraldine base form of **polyaniline**) on the presence of traces of ionic species which compensate injected charges at the electrodes, thus reducing the electron and hole injection barriers.

L20 ANSWER 55 OF 232 CA COPYRIGHT 2002 ACS
AN 130:24210 CA
TI Predicting organoleptic scores of sub-ppm flavor notes. Part 1. Theoretical and experimental details
AU Pearce, Timothy C.; Gardner, Julian W.
CS Department of Engineering, University of Leicester, Leicester, LE1 7RH, UK
SO Analyst (Cambridge, U. K.) (1998), 123(10), 2047-2055
AB Most existing electronic **nose** systems have limited com. application since they only provide a relative description of the flavor under investigation, rather than one against a universal std. However, the development of a set of universally accepted stds. for flavor description has been problematic due to the lack of any comprehensive model relating the mol. structure of an odorant with its flavor-impact during the act of perception. Instead, industries have tended to develop their own flavor models (flavor terminol. systems) for specific consumer products that are based upon practical experience of a particular food, cosmetic, or beverage. We report here on the novel application of chem. multi-**sensor** arrays to the prediction of organoleptic flavor notes, as defined under a specific terminol. system suitable for describing and communicating specific flavors. A novel **odor** mapping scheme is proposed that may be applied generally to multi-**sensor** arrays and provides more detailed characterization of **odor** quality than is currently achievable. As part of our study, a flow injection analyzer (FIA) system has been developed that combines chem. and electronic hardware driven by a microcomputer to achieve accurate and independent control over **odor**-stream temp., flow-rate and flow profile, **sensor** head temp. and sample times. An array of 24 **conducting polymer sensors** (11 different types) is used within the FIA system, giving an overall exptl. coeff. of variation below 7%. The application of this **odor** mapping technique is demonstrated by way of an exptl. study, using the FIA system reported here. The details for this study are given in Part 1, and the computational anal. of the data is carried out in Part 2 (T. C. Pearce and J. W. Gardner, 1998).

L20 ANSWER 56 OF 232 CA COPYRIGHT 2002 ACS
AN 130:12133 CA
TI Molecular wire injection **sensors**
IN Keen, Randy E.
PA Keensense, Inc., USA
SO PCT Int. Appl., 79 pp.

| | | | | |
|---|---|---|---|---|
| PI | WO 9852042 | A1 | 19981119 | WO 1998-US9838 19980513 |
| | US 6060327 | A | 20000509 | US 1997-856822 19970514 |
| PRAI | US 1997-856822 | A | 19970514 | |

AB Disclosed is a **sensor** for **sensing** the presence of an analyte component without relying on redox mediators. This **sensor** includes a plurality of

**conductive polymer** strands each having at least a first end and a second end and each aligned in a substantially common orientation; a plurality of mol. recognition headgroups having an affinity for the analyte component and being attached to the first ends of the **conductive polymer** strands; and an electrode substrate attached to the **conductive polymer** strands at the second ends. The electrode substrate is capable of reporting to an electronic circuit reception of mobile charge carriers (electrons or holes) from the **conductive polymer** strands. The electrode substrate may be a photovoltaic diode.

L20 ANSWER 57 OF 232 CA COPYRIGHT 2002 ACS
AN 129:331650 CA
TI Insulator-**semiconductor** composite polyoxyphenylene-**polypyrrole**: electrochemical synthesis, characterization and chemical **sensing** properties
AU Aguilar-Hernandez, J.; Skarda, J.; Potje-Kamloth, K.
CS Inst. Physik, Fak. Elektrotechnik, Univ. Bundeswehr-Munchen, Neubiberg, D-85577, Germany
SO Synth. Met. (1998), 95(3), 197-209
AB A study of the in situ electrochem. prepn. of conductive composite films of **polypyrrole** and non-conducting polyoxyphenylene is presented. Electropolymns. of pyrrole were carried out in the presence of the phenolic monomers 2-allylphenol (2AP) and 4-hydroxybenzenesulfonic acid sodium salt (4HBS) in an aq. alk. soln. (pH=9) of tetramethylammoniumhydroxide. The prepn. conditions were optimized in order to obtain flat, smooth and pinhole-less **electroactive** films, which were characterized by measuring their optical (UV-Vis and IR), morphol. (SEM) and elec. properties (a.c. cond.). The optimized polymn. conditions led to the growth of lightly overoxidized films, whose properties depart slightly from the usual well-known properties of highly **electroactive polypyrrole** films. Some of the investigated properties resemble those of conducting **polypyrrole**; however, they showed some differences, mainly in the optical and elec. characteristics due to the prepn. of an inert matrix, produced by the simultaneous polymn. of the phenolic compd., 2AP. IR absorption spectroscopy indicates that the second phenolic compd., 4HBS, serves as a dopant for **polypyrrole** and, therefore, enables the polymn. of a conductive film in alk. media. The **sensing** properties of the **polypyrrole**-polyoxyphenylene (PPy-POP) films towards dimethylmethylphosphonate (DMMP) were investigated by work function measurements and compared with commonly prepd. PPy films. Tetrasulfonated metallophthalocyanines (MPcTS, M=Ni, Cu, Fe(II), Co) and 4HBS were used as dopants for PPy. The response time (t90%) of the sensitive layers decreases from 20-40 min for PPy films to 3-5 min for PPy-POP films, which was assumed to be due to the lower packing d. of the composite film. The sensitivity of the PPy-POP layers to DMMP lies in the range of 66-76 meV (ppm decade)-1.

L20 ANSWER 60 OF 232 CA COPYRIGHT 2002 ACS
AN 129:265155 CA
TI Electronic **nose** versus multicapillary gas chromatography: application for rapid differentiation of essential oils
AU Talou, T.; Maurel, S.; Gaset, A.
CS Agro-industrial Chemistry Laboratory (UA INRA 31A1010), National Polytechnic Institute of Toulouse, Toulouse, 31077, Fr.
SO Dev. Food Sci. (1998), 40(Food Flavors: Formation, Analysis, and Packaging Influences), 79-86
AB Within the past five years, there has been a rapid development of electronic **nose** technol., i.e. multi gas **sensor** devices coupled to statistical results data processing, which provides the advantage for faster differentiation of complex mixts. of volatile compds. as compared to

gas chromatog. A comparative study on the differentiation of essential oils representative of the major arom. notes of "The Field of **Odors**" [Jaubert et al 1987, 1995] by electronic **nose**, equipped with an array of **conducting polymers** gas **sensors** and by gas chromatog. was carried out. The new concept of multicapillary column allowing redn. of time anal. to a few minutes was used in this study.

L20 ANSWER 63 OF 232 CA COPYRIGHT 2002 ACS
AN 129:220224 CA
TI Plasticized polymeric electrolytes: new extremely versatile receptor materials for gas **sensors** (VOC monitoring) and electronic **noses** (**odor** identification/discrimination)
AU Buhlmann, K.; Schlatt, B.; Cammann, K.; Shulga, A.
CS Institut fur Chemo- und Biosensorik, Munster, D-48149, Germany
SO Sens. Actuators, B (1998), B49(1-2), 156-165
AB A new class of receptor materials for gas **sensors** for volatile org. compds. (VOC) was developed: plasticized polymeric electrolytes (PPE). A PPE usually consists of three components: a polymer; a plasticizer; and an org. salt. In an extensive systematic study more than 500 compns. using seven polymers, eight plasticizers and four org. salts were tested in order to investigate the effect of individual components and their ratio on the gas **sensing** properties (selectivity, sensitivity, etc.) of the PPE. The operation of a PPE-based gas **sensor** is based on a variation of the bulk ionic cond. of the receptor layer due to absorption of an ambient vapor. The specific conductance of the used PPE compns. is usually between 0.1 and 10 $\mu$S x cm-1 and it may vary more than 100 times in the dynamic range of the gas **sensor**, which stretches typically from low ppm up to some 10000 ppm. The PPE-based gas **sensors** using miniaturized interdigitated transducers demonstrate a remarkable variety of their properties depending on the PPE compn. The performance of single **sensors** and **sensor** arrays was thoroughly studied.

L20 ANSWER 64 OF 232 CA COPYRIGHT 2002 ACS
AN 129:210223 CA
TI **Conductive polymer sensor** measurements
AU Harris, P. D.; Andrews, M. K.; Partridge, A. C.
CS Industrial Research Limited, Lower Hutt, N. Z.
SO Transducers 97, Int. Conf. Solid-State Sens. Actuators (1997), Volume 2, 1063-1066 Publisher: Institute of Electrical and Electronics Engineers, New York, N. Y.
AB **Conducting polymers** have become popular as a means to sense odorous gasses, however the change in polymer resistance upon exposure to typical gas concns. can be very small. Sensitivity is ultimately limited by the resistance measurement itself. The passage of d.c. current through the polymer generates high levels of excess noise, with a 1/f characteristic, which increases as approx. the square root of current. This behavior is consistent with the granular structure of the material. Also the combination of low thermal mass of a typical polymer resistor and its thermal isolation makes it susceptible to self heating. Given typical temp. coeffs. of resistance (eg -2%/°C for PPY/DS), measured resistances can be affected by ambient gas flow rates unless the measuring power is small. The use of a.c. techniques can provide significant S/N improvement at low measurement powers (voltages), where the resistance characteristic is most linear, enabling accurate resistance measurement in olfactory applications.

L20 ANSWER 65 OF 232 CA COPYRIGHT 2002 ACS
AN 129:135327 CA

TI Discrimination of wine using taste and **smell sensors**
AU Baldacci, Stefano; Matsuno, Tetsuya; Toko, Kiyoshi; Stella, Rita; De Rossi, Danilo
CS Centro "E. Piaggio", Facolta di Ingegneria, Universita di Pisa, Pisa, 56100, Italy
SO Sens. Mater. (1998), 10(3), 185-200
AB A taste-**smell** sensory fusion was achieved by combining a taste **sensor** array using lipid/polymer membranes and a **smell sensor** array using **conducting polymer** elements. Responses to different brands of wine were investigated and a clear discrimination among different samples was obtained by processing the data from either type of **sensor**. The effect of the aging process on the quality of wine was also studied. The system can discriminate between differently aged samples of the same red wine. The information provided by one type of array is independent of that provided by the other and their combination enhances the overall information available concerning the sample being measured. This suggests that the sensory fusion can be a powerful way to improve the performance of **sensor** technologies currently available.

L20 ANSWER 67 OF 232 CA COPYRIGHT 2002 ACS
AN 129:121741 CA
TI Discrimination of thermally treated orange juices by an electronic **nose** equipped with organic polymer **sensors**
AU Bazemore, Russell; Rouseff, Russell
CS University of Florida Citrus Research and Education Center, Lake Alfred, FL, 33850, USA
SO Semin. Food Anal. (1998), 3(1), 59-66
AB An electronic **nose** was used to discriminate between juices from the most popular and economically important orange cultivars in Florida. Early-mid season (Hamlin, Pineapple, and Parson Brown) and late season (Valencia) orange juice samples were divided into four groups according to the following time-temp. treatments (pasteurization): no heat (unpasteurized), 8 s at 96°C, 120 s at 96°C, and 180 s at 96°C (severely pasteurized). An electronic **nose** equipped with 12 org. polymer **sensors** was able to discriminate between early-mid season juice exposed to different time-temp. treatments, and also between early-mid and late season cultivars. Discrimination between late season juice samples exposed to different heat treatments was less successful. The development of **sensors** specific for flavor impact volatiles should improve this technol.

L20 ANSWER 69 OF 232 CA COPYRIGHT 2002 ACS
AN 129:117237 CA
TI Pseudo-random binary sequence interrogation technique for gas **sensors**
AU Amrani, M. E. H.; Dowdeswell, R. M.; Payne, P. A.; Persaud, K. C.
CS Department of Instrumentation and Analytical Science, UMIST, Manchester, M60 IQD, UK
SO Sens. Actuators, B (1998), B47(1-3), 118-124
AB Elec. **conducting** org. **polymers** are widely used as a means of gas, **odor** or **aroma** anal. using multielement array techniques coupled with d.c. interrogation techniques. Recently, the use of a.c. interrogation gives rise to improved performance. The need to use multielement arrays is much reduced since a single **sensor** can be interrogated at a wide range of frequencies. This paper describes the use of pseudo-random binary sequences (PRBS) as interrogation signals for semiconducting org. polymer gas **sensors**. Preliminary expts. were conducted upon volatile vapors and results are presented herein.

L20 ANSWER 70 OF 232 CA COPYRIGHT 2002 ACS

AN 129:109782 CA
TI A unique approach to the quality control of packaging materials through **aroma** analysis
AU Cyr, Jennifer A.
CS AromaScan, Inc., Hollis, NH, 03049, USA
SO Polym., Laminations, Coat. Conf. (1997), Volume 2, 493-497 Publisher: TAPPI Press, Atlanta, Ga.
AB The packaging material for any no. of products including food, cosmetics and pharmaceuticals is designed to protect that product from contaminants until it is opened by a consumer. If that packaging material is tainted by the coating, printing ink or adhesive used in its manuf., it can affect the material it contains and in turn affect the perceived quality of the product. In combination with human sensory evaluation, the AromaScan Digital **Aroma** Anal. System can be employed to discriminate between acceptable and unacceptable **odor** levels in packaging. Used in a quality control environment, the **aroma detector** can successfully discriminate sample types including plastic packaging, paperboard packaging as well as the ink, adhesives and coating materials used in their prodn. The digital **aroma** analyzer utilizes **conducting polymer** technol. The system is able to detect volatile chems. which temporarily adsorb and then desorb from the polymers. The system draws sample headspace across an array of 32 different polymer **sensors**. The volatile chems. in the headspace will interact with the **sensor** array based on polarity, size and shape to produce a characteristic profile or fingerprint. This profile represents a temporary change in the resistance of the polymer caused by the interaction of the volatiles. This profile can then be compared to known stds. run by the user. With this technol., any user is now able to have a visual representation of an **odor**. The system includes an artificial neural network which can be trained to recognize std. profiles and in turn be used to classify unknown samples rapidly. This paper will provide data that demonstrates how the digital **aroma** analyzer can be utilized to address **odor** problems in the packaging industry.

L20 ANSWER 71 OF 232 CA COPYRIGHT 2002 ACS
AN 129:85605 CA
TI A novel approach to detect odorants in water
AU Thompson, Artis; Matthews, Nancy; McCrary, Diane; Russell, Marcy
CS Gulf Coast Water Authority, Texas City, TX, USA
SO Proc. - Water Qual. Technol. Conf. (1997), Volume Date 1996 26-29
AB This paper explains the success of Gulf Coast Water Authority (GCWA) in using a digital **aroma** anal. system for its **odor** testing of source water, treatment plant processes and distribution system. The **aroma** anal. system draws volatile chems. from the headspace of a sample over an array of 32 unique elec. **conducting** org. **polymer sensors**. These polymeric materials are chem. tailored to give high specificity to particular classes of volatile chems. The **sensors** rapidly adsorb and subsequently desorb the sample volatiles on the **sensor** surface, causing temporary changes in the inherent base elec. resistance of each **sensor**. The base resistance changes ($\Delta R$ values), which vary in intensity according to the nature of the **aroma** and the affinity of the **aroma** volatiles for each **sensor** surface, are translated into an **aroma** histogram or fingerprint and an **aroma** intensity profile. The **aroma** analyzer, using neural network software technol., is then trained to identify a particular **odor** based on the **aroma** fingerprint. Using this system, the GCWA lab. has been able to detect changes in treatment, pinpoint problem areas, and detect levels of odorants which were not apparent using traditional **odor** testing methods. Problems related to operator fatigue, odorant identification, anal. time, and expense, have been reduced.

L20 ANSWER 72 OF 232 CA COPYRIGHT 2002 ACS
AN 129:51691 CA
TI Chemical and biological **sensors** having **electroactive** polymer thin films attached to microfabricated devices and possessing immobilized indicator moieties
IN Guiseppi-Elie, Anthony
PA USA
SO U.S., 30 pp. Cont.-in-part of U.S. 5,352,574.

| | | | | |
|---|---|---|---|---|
| PI | US 5766934 | A | 19980616 | US 1994-318494 19941004 |
| | US 5352574 | A | 19941004 | US 1991-771759 19911004 |
| PRAI | US 1989-322670 | | 19890313 | |

AB Chem. and biol. **sensors** are provided that convert the chem. potential energy of an analyte into a proportionate elec. signal through the transducer action of a microfabricated device with an integral electroconductive polymer film. The microsensor devices possess a coplanar arrangement of at least one, and typically three, microfabricated interdigitated microsensor electrode arrays each with line and space dimensions that may range from 2-20 μm and is typically 10 μm, a platinized **platinum** counter electrode of area at least 10 times the area of the interdigitated microsensor electrode array and a chloridized **silver/silver** chloride ref. electrode. Chem. and biol. **sensors** constructed according to the present invention employ a thin **elec. conducting polymer** film that is specifically attached via covalent bond formation to the interdigitated microsensor electrode component of the devices. The **elec. conducting polymer** film is formed in three layers, the first layer possesses high **elec. cond.** and is covalently attached to the device surface, the second layer possess an inorg. catalyst and is covalently attached to the first, and the third layer possesses an indicator mol. which may be a bioactive mol. such as an enzyme or member of specific binding pair of biol. origin and is itself covalently attached to the second layer. Binding of an analyte or member of the specific binding pair reagent may result in a change in the elec. impedance (resistance and capacitance or both) of the highly **elec. conducting** layer. The elec. change in the polymer layers is a sensitive measure of the extent of binding of the binding agent and forms an anal. signal for the binding agent.

L20 ANSWER 77 OF 232 CA COPYRIGHT 2002 ACS
AN 128:261534 CA
TI Determination of volatile content in a distribution water supply
AU Cyr, Jennifer A.
CS AromaScan, Hollis, NH, 03049-6595, USA
SO Am. Environ. Lab. (1998), 10(3), 14-15
AB The Aqua-Q uses an an array of 342 **conducting polymer sensors** as the mode of detection of odorous volatile compds. in water at any stage of processing. Sampling is done by passing clean humidified air through the water and forcing the volatiles into the headspace of a 500-mL sampling vessel. The volatile org. chems.from the headspace gas interact with polymers in the **sensors**, producing a temporary reversible change in the resistance, which change is recorded as an **aroma** fingerprint, thus producing a visual representation of a **smell**. The method can be used to det. the performance of aging water filters. The system can be used to test source water for pollution and to det. the geog. origin of water samples.

L20 ANSWER 80 OF 232 CA COPYRIGHT 2002 ACS
AN 128:179560 CA
TI Detection of **aroma** above a coffee powder: limits and perspectives of electronic **sensors**

AU Gretsch, C.; Delarue, J.; Toury, A.; Visani, P.; Liardon, R.
CS Nestle R D Orbe, Orbe, CH-1350, Switz.
SO Colloq. Sci. Int. Cafe (1997), 17th, 183-190
AB Gas **sensors** (electronic **noses**) based on **conducting polymers** and metal oxides were tested for discrimination between instant coffees with or without a flavoring oil. The **conducting polymer sensor** gave disappointing results, apparently because of a high sensitivity to moisture and carbon dioxide desorbing from the coffee powder. Better discrimination was achieved with metal oxide **sensors**, mostly on the basis of overall intensity and the presence of some sulfur components. The limit of sensitivity was in the range of 20 ppb.

L20 ANSWER 82 OF 232 CA COPYRIGHT 2002 ACS
AN 128:175633 CA
TI Oligomeric anilines and soluble **polypyrroles** as **sensors** for volatile organic compounds
IN MacDiarmid, Alan G.; Zhang, Wanjin; Feng, Jing
PA The Trustees of the University of Pennsylvania, USA; MacDiarmid, Alan G.; Zhang, Wanjin; Feng, Jing
SO PCT Int. Appl., 99 pp.
PI WO 9804908 A1 19980205 WO 1997-US13148 19970725
PRAI US 1996-22694P P 19960726
AB The present invention generally describes **sensors** and **sensor** arrays for volatile org. compds., wherein the **sensor** comprises at least two electrodes and a compn. which comprises an **electroactive** material. Generally, the **electroactive** material is a sol. **polypyrrole** or an oligomeric aniline, such as tetraaniline, octaaniline or hexadecaaniline. The compn. may further comprise a dopant anion or dopant acid.

L20 ANSWER 83 OF 232 CA COPYRIGHT 2002 ACS
AN 128:175580 CA
TI An intelligent gas **sensing** system
AU Amrani, M. E. Hassan; Dowdeswell, Richard M.; Payne, Peter A.; Persaud, Krishna C.
CS Dep. of Instrumentation and Analytical Science, UMIST, Manchester, M60 1QD, UK
SO Sens. Actuators, B (1997), B44(1-3), 512-516
AB Elec. **conducting** org. **polymers** are widely used as a means of gas, **odor** or **aroma** anal. using multielement array techniques coupled with d.c. interrogation techniques. Recently the use of a.c. interrogation gives rise to improved performance. The need to use multielement arrays is much reduced since a single sector can be interrogated at a wide range of frequencies. This gives rise to much increased information content for the measurements. This paper describes the use of a.c. interrogated **conducting** org. **polymers** coupled with neural network pattern recognition techniques for a system to det. the compositional fraction of volatile vapor mixts. Expts. were conducted on binary, tertiary and quaternary mixts. of vapors and compositional fractions within 5%.

L20 ANSWER 88 OF 232 CA COPYRIGHT 2002 ACS
AN 128:87907 CA
TI Sniffing out trouble: Use of an electronic **nose** in bioprocesses
AU Namdev, Pradyumna K.; Alroy, Yair; Singh, Vijay
CS Biotechnology Development, Schering-Plough Research Institute, Union, NJ, 07803, USA
SO Biotechnol. Prog. (1998), 14(1), 75-78
AB Given the considerable time and expense invested in a single bioprocess (fermn.) batch, variability and losses must be identified quickly. The

authors propose that "sniffing" the **odor** of cultivation media and broth using instruments could provide a rapid and early indication of bioprocess performance. The human sensation of **odor** is related to the mol. compn. of the vapor phase. The traditional approach to characterize volatile compds. has been sample extn. followed by GC-MS anal. This approach is very tedious and requires some knowledge of the mols. involved. A new, alternate approach based on an "electronic **nose**" is now available which, like the human **nose**, can directly characterize the **odor** without ref. to chem. compn. Here, an array of "**conductive polymer**" **sensors** with different chem. sensitivities produces a set of different responses to the same **odor**. The responses are analyzed math., using pattern recognition techniques, to differentiate between different **odors** with a high level of sensitivity. The authors demonstrate the feasibility of using a com. available electronic **nose** for the following applications: monitoring lot-to-lot variation in bioprocess medium ingredients, **detecting** microbial contamination early, and evaluating bioprocess performance during cultivation of microorganisms at inoculum and prodn. stages.

L20 ANSWER 89 OF 232 CA COPYRIGHT 2002 ACS
AN 128:65553 CA
TI Chemoresistive **conducting polymer**-based **odor sensors**: influence of thickness changes on their **sensing** properties
AU Stussi, Elisa; Stella, Rita; De Rossi, Danilo
CS Via Diotisalvi, Facoltadi Ingegneria, Centro 'E. Piaggio', 2, I-56126 Pisa, Italy
SO Sens. Actuators, B (1997), B43(1-3), 180-185
AB **Conducting polymer** films are widely used in the detection of **odors**. The change of resistance in the presence of odorants depends on the polymer thickness, and affects the sensitivity properties of the device. Using the vapor phase polymn. technique it is possible to fabricate polymer layers of controllable, uniform thickness. Aiming at the characterization of polymeric **sensors** as a function of their thickness, we implemented **sensors** of different thicknesses and carried out sensitivity measurements using toluene as an analyte. Sensitivity in terms of percentage variation of resistance per unitary **odor** concn. change was found to decrease with increasing thickness. Data on sensitivity as a function of thickness is presented and a possible explanation is proposed to account for the exptl. obsd. behavior.

L20 ANSWER 90 OF 232 CA COPYRIGHT 2002 ACS
AN 128:26127 CA
TI Development of an electronic **nose**
AU Barisci, Joseph N.; Andrews, Mike K.; Harris, Paul; Partridge, Ashton C.; Wallace, Gordon G.
CS Intelligent Polymer Res. Inst., Univ. Wollongong, 2522, Australia
SO Proc. SPIE-Int. Soc. Opt. Eng. (1997), 3242(Smart Electronics and MEMS), 164-171
AB A system for detection of volatile compds. has been developed based on the concept of an electronic **nose**. The detection mechanism relies on the change in elec. resistance that occurs when a **conducting polymer sensing** element is exposed to the gaseous sample. An array of such **sensors** in conjunction with pattern recognition data anal. are used to identify and quantify the compds. of interest.

L20 ANSWER 92 OF 232 CA COPYRIGHT 2002 ACS
AN 127:354264 CA
TI **Sensor** using electric conductor polymer film as **sensing** part
IN Yoshii, Mitsuyoshi; Inoue, Naoaki

PA Shimadzu Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
PI JP 09289306 A2 19971104 JP 1996-100812 19960423
AB In a **sensor**, a noble metal electrode is formed on a substrate and an org. film, esp., a polymer film, is formed on the electrode. An Al film intervenes between the electrode and the substrate. The pattern of the electrode and that of the Al film is different partially so that the Al film is exposed partially. A wire is bonded on the exposed part. The **sensor**, e.g., **odor sensor**, etc., can be prepd. in a process without passing heat history.

L20 ANSWER 97 OF 232 CA COPYRIGHT 2002 ACS
AN 127:139477 CA
TI Polymer-oxide-silicon-field-effect-transistor (POSFET) as **sensor** for gases and vapors
AU Meister, Veit; Potje-Kamloth, Karin
CS Fakultat fur Elektrotechnik, Institut fur Physik, Universitat der Bundeswehr Munchen, Neubiberg, D-85577, Germany
SO Proc. - Electrochem. Soc. (1997), 97-19(Chemical and Biological Sensors and Analytical Electrochemical Methods), 16-22
AB A gas **sensor** based on a field effect transistor (FET) was developed for the detection of low concns. (ppm) of vapors and gases in air. The structure is similar to that of a MOSFET, in which the metal gate is replaced by an electrochem. deposited polymer gate. We used **polypyrrole** doped with different anions, such as metallophthalocyanines, tosylate, or dodecyl sulfate, as gas **sensing** materials. The gate polymer was electrochem. grown on top of the gate insulator from an aq. soln. by means of a lateral polymn. process. Using this work function **sensor**, good results were obtained in ambient air at room temp. In the presence of 40 ppm DMMP, the gate-voltage decreased from 0.54V to 0.51V upon the application of a drain-current of 5$\mu$A with 200 mV drain-source voltage. For a **polypyrrole** film doped with tosylate and dodecylsulfate, a work function change of 100 mV for 18 ppm NOx was obsd.

L20 ANSWER 98 OF 232 CA COPYRIGHT 2002 ACS
AN 127:132941 CA
TI A new method for dispersing palladium microparticles in **conducting polymer** films and its application to biosensors
AU Yamato, Hitoshi; Koshiba, Takafumi; Ohwa, Masaki; Wernet, Wolfgang; Matsumura, Michio
CS International Research Laboratories, Ciba-Geigy (Japan) Ltd., 10-66 Miyuki-cho, Takarazuka, 665, Japan
SO Synth. Met. (1997), 87(3), 231-236
AB Composite films of **polypyrrole**/sulfated poly(β-hydroxyethers) (PPy/S-PHE) are **elec. conducting** and mech. flexible. Palladium particles were dispersed in the films by thermally decompg. bis(dibenzylideneacetone)palladium(0) complex which had been absorbed by the films from a CHCl3 soln. This method for loading metal particles was enabled by the high affinity of the composite films for org. compds. TEM and energy-dispersive x-ray spectrometry (EDX) analyses revealed that fine palladium particles in the nanometer range are dispersed in the PPy/S-PHE conducting films. A glucose **sensor** based on the detection of hydrogen peroxide was prepd. by immobilizing glucose oxidase (GOD) using glutaraldehyde on a Pd/PPy/S-PHE electrode. This biosensor responded to glucose even at 400 mV vs. Ag/AgCl, which is lower than the working potential of conventional glucose **sensors** prepd. on a **platinum** electrode.

L20 ANSWER 100 OF 232 CA COPYRIGHT 2002 ACS

AN 127:101674 CA
TI "Electronic **noses**" and microcontact-printed liquid crystal displays using conjugated polymers
AU Macdiarmid, Alan G.; Zhang, Wanjin; Adebimpe, David E.; Wang, Pen-Cheng; Huang, Zheyuan
CS University of Pennsylvania, PA, USA
SO Annu. Tech. Conf. - Soc. Plast. Eng. (1997), 55th(Vol. 2), 1454-1458
AB Thin films of doped **polypyrrole** on interdigitated gold arrays serve as gas **sensors** undergoing reversible changes in resistance upon exposure to gases (e.g., to alternating exposure to a stream of toluene vapor in nitrogen and to nitrogen alone). Analogous types of changes together with changes in vis/UV spectra occurred with poly(3-hexylthiophene) **sensors** in a static system. Microcontact-printed patterns of **polypyrrole** can be readily used in conjunction with a com. liq. crystal blend to produce patterned liq. crystal displays.

L20 ANSWER 101 OF 232 CA COPYRIGHT 2002 ACS
AN 127:67820 CA
TI Manufacture and use of **sensor** materials whose electric resistance is very sensitive to a change in shape of the materials
IN Vorbach, Dieter; Taeger, Eberhard
PA Thueringisches Institut fuer Textil- und Kunststoff-Forschung e.V., Germany
SO Ger. Offen., 4 pp.
PI DE 19542533 A1 19970522 DE 1995-19542533 19951115
GB 2322378 A1 19980826 GB 1997-3828 19970225
PRAI DE 1995-19542533 A 19951115
AB The process comprises forming a soln. of 2-25 wt.% org. polymer in a solvent contg. a dispersion of ≥1 **elec. conductive** powders in an amt. corresponding to the percolation-induced swelling of the **sensor** material, molding the mixt. by extrusion or casting, and removing the solvent. The **sensor** materials are produced in the form of filaments or foils supported on a carrier and whose ends are provided with elec. contacts, and are used as hygrometers, pressure, and temp. **sensors**. C powder (particle size <1 μm) was dispersed in a 10-wt.% soln. of cellulose in N-Methyl-morpholine-N-oxide monohydrate n an amt. of 120 wt.% (based on the cellulose). The mixt. was spun to obtain a filament (thickness 20 μm). After drying, the filament had sp. resistance 0.03, vs. 1.3 Ω·cm after wetting with water.

L20 ANSWER 103 OF 232 CA COPYRIGHT 2002 ACS
AN 126:271443 CA
TI Gas **sensing** with **conducting polymer** thin film resistors obtained from commercial photoresist patterns
AU Bruschi, P.; Diligenti, A.; Nannini, A.
CS Dipartimento di Ingegneria dell'Informazione, Elettronica, Informatica, Telecomunicazioni, Universita degli Studi di Pisa, Pisa, I-56126, Italy
SO Sens. Microsyst., Proc. Ital. Conf., 1st (1996), 69-73. Editor(s): Di Natale, Corrado; D'Amico, Arnaldo. Publisher: World Scientific, Singapore, Singapore.
AB Thin films of **polypyrrole** were obtained by polymn. from the vapor phase onto oxidizing patterns of com. photoresist modified by addiction of chlorinated Cu nano-particles. The morphol. and elec. characterization of the **polypyrrole**/photoresist films is described. The time stability and sensitivity to gases are presented.

L20 ANSWER 105 OF 232 CA COPYRIGHT 2002 ACS
AN 126:183313 CA
TI **Sensor** array techniques for mimicking the mammalian olfactory system
AU Persaud, Krishna C.; Khaffaf, Soad M.; Payne, John S.; Pisanelli, Anna

Maria; Lee, Dong-Hyun; Byun, Hyung-Gi
CS DIAS, UMIST, PO Box 88, Sackville Street, Manchester, M60 1QD, UK
SO Sens. Actuators, B (1996), B36(1-3, Proceedings of the Sixth International Meeting on Chemical Sensors, 1996), 267-273
AB Scales of human **odor** perception are subjective and there is much need for automated methods of **odor** measurement in a variety of industries. Org. **conducting polymers** have been developed as **sensing** devices, and many materials have been synthesized and characterized. The **sensors** show rapid adsorption and desorption characteristics and allow rapid measurements to be made. The responses are proportional to the concn. of the volatile chem. being sensed, and with calibration can be used to quantify single chem. species. Arrays of **sensors** produce patterns of responses that can be used as descriptors for discriminating complex **odors**. Examples of applications in food quality monitoring and agriculture malodors are given. The **sensor** array response may be correlated with olfactometric measurements in the case of pig slurry malodor.

L20 ANSWER 106 OF 232 CA COPYRIGHT 2002 ACS
AN 126:182410 CA
TI Breath alcohol, multi **sensor** arrays and electronic **noses**
AU Paulsson, Nils; Winquist, Fredrik
CS S-SENCE and SKL - National Laboratory of Forensic Science, Linkoping, S-581 94, Swed.
SO Proc. SPIE-Int. Soc. Opt. Eng. (1997), 2932(Human Detection and Positive Identification: Methods and Technologies), 84-90
AB The concept behind a Volatile Compd. Mapper (VCM), or electronic **nose**, is to use the combination of multiple gas **sensors** and pattern recognition techniques to detect and quantify substances in gas mixts. There are several different kinds of **sensors** which have been developed during recent years of which the base techniques are **conducting polymers**, piezo elec. crystals and solid state devices. In this work the authors have used a combination of gas sensitive field effect devices and semiconducting metal oxides. The most useful pattern recognition routine was found to be Artificial Neural Networks (ANN), which is a math. approxn. of the human neural network. The aim of this work is to evaluate the possibility of using electronic **noses** in field instruments to detect drugs, arson residues, explosives etc. As a test application we have chosen breath alc. measurements. There are several reasons for this. Breath samples are a quite complex mixt. contg. between 200 and 300 substances at trace levels. The alc. level is low but still possible to handle. There are needs for replacing large and heavy mobile instruments with smaller devices. Current instrumentation is rather sensitive to interfering substances. The work so far has dealt with sampling, how to introduce ethanol and other substances in the breath, correlation measurements between the electronic **nose** and headspace GC, and how to evaluate the **sensor** signals.

L20 ANSWER 107 OF 232 CA COPYRIGHT 2002 ACS
AN 126:180469 CA
TI **Odor sensors** based on **conducting polymers** realized by vapor phase polymerization
AU De Rossi, D.; Gestri, G.; Stella, R.; Stussi, E.
CS Centro "E. Piaggio", Universita degli Studi di Pisa via Diotisalvi, Pisa, I-56126, Italy
SO Sens. Microsyst., Proc. Ital. Conf., 1st (1996), 64-68. Editor(s): Di Natale, Corrado; D'Amico, Arnaldo. Publisher: World Scientific, Singapore, Singapore.
AB We used **conducting polymer** thin films as **odor sensors**. The **sensors** are realized by vapor phase polymn., which is carried out in a purposedly built

reactor for solid monomers. **Sensors** are tested with various alcs. and their steady state percentage resistance changes are recorded. The alcs. tested were discriminated using an artificial neural network that mimics the natural olfactory system.

L20 ANSWER 110 OF 232 CA COPYRIGHT 2002 ACS
AN 126:98613 CA
TI **Copper** dispersed into **polyaniline** films as an amperometric **sensor** in alkaline solutions of amino acids and polyhydric compounds
AU Casella, Innocenzo G.; Cataldi, Tommaso R. I.; Guerrieri, Antonio; Desimoni, Elio
CS Dipartimento di Chimica, Universita degli Studi della Basilicata, Via N. Sauro 85, Potenza, 85100, Italy
SO Anal. Chim. Acta (1996), 335(3), 217-225
AB A chem. modified electrode composed of **copper** microparticles dispersed into a **polyaniline** (PANI) film was studied as an amperometric **sensor** of scantly **electroactive** compds. possessing -OH and -NH2 groups. Glassy carbon was used as an electrode material and modified firstly by a PANI film, then allowed to stand in contact with a soln. of **copper** ions, and finally, the electroredn. was done at -0.3V. The electrochem. behavior of the resulting modified electrode in alk. medium was examd. by cyclic voltammetry and flow-injection amperometry. Using some representative compds., the effect of **copper** loading and pH on the electrode response was studied. Const.-potential amperometric detection was applied in conjunction with anion-exchange chromatog. (AEC) sepns. of amino acids and carbohydrates. At an applied potential of 0.55 V vs. Ag/AgCl, the detection limits (S/N = 3) for all analytes studied ranged 5-15pmol, and the linear dynamic range was three-four orders of magnitude above the detection limits. The resulting modified electrode was found to retain 95% of its initial response in flowing streams for 3h of operating time.

L20 ANSWER 115 OF 232 CA COPYRIGHT 2002 ACS
AN 125:346596 CA
TI Multi-frequency measurements of organic **conducting polymers** for **sensing** of gases and vapors
AU Amrani, M. E. Hassan; Payne, Peter A.; Persaud, Krishna C.
CS Dep. Instrumentation and Anal. Sci., Manchester, M60 1QD, UK
SO Sens. Actuators, B (1996), B33(1-3), 137-141
AB Elec. **conducting** org. **polymers** display elec. **conductivities** that are dependent on the concn. of dopant ions incorporated in the material. The cond., usually measured using d.c. techniques, may be modulated reversibly and rapidly at ambient temp. by adsorption and desorption of volatile chems. This phenomenon has immense practical use for gas and **odor sensing**. By using arrays of **conducting polymer sensors** having broadly overlapping specificity to a range of volatiles, we are able to measure and assign descriptors to the volatiles. In this paper we show that similar descriptors can be generated by using a.c. (ac) at suitable frequencies to follow the changes in **sensor** capacitance, conductance and dissipation factor. We also show that using a single **sensor** we can obtain discrimination between chem. species. The ac response characteristics of these **sensors** have been modelled using a simple elec. circuit equiv. and we how that the model is a good predictor of **sensor** performance.

L20 ANSWER 116 OF 232 CA COPYRIGHT 2002 ACS
AN 125:337556 CA
TI Assessment of **conducting polymer odor sensors** for agricultural malodor measurements
AU Persaud, Krishna C.; Khaffaf, Soad Mohialdin; Hobbs, Philip J.; Sneath,

Robert W.
CS Dept. of Instrumentation and Analytical Science, UMIST, Manchester, M60 1QD, UK
SO Chem. Senses (1996), 21(5), 495-505
AB The major odoriferous components of fresh pig slurry were identified using gas chromatog. coupled to mass spectrometry. From the anal. data, a std. artificial slurry was reconstituted. The performance of **conduction polymer odor sensor** arrays was evaluated using the individual chem. volatile components and the artificial slurry itself. Most of the components are discriminated from each other, when presented singly to the **sensor** array. The **sensors** are not poisoned by the chems. and give reproducible responses over a 3 mo period. The **odor** components being detected from an artificial alk. pig slurry appear to be assocd. with patterns obtained from indole, skatole and ammonia. The intensity of the signal is proportional to the concn. of the volatiles presented to the **sensor**. The results indicate that **conducting polymer sensor** arrays show promise for measurement of agricultural malodors, and may complement olfactometric techniques.

L20 ANSWER 117 OF 232 CA COPYRIGHT 2002 ACS
AN 125:337393 CA
TI The electronic measurement of **odors** and **aromas**
AU Tullett, Chris
CS UK
SO Case Stud. Environ. Technol. (1996), 83-93. Editor(s): Sharratt, Paul; Sparshott, Michael. Publisher: Institution of Chemical Engineers, Rugby, UK.
AB An electronic app. for the measurement of **odors** based on the reversible interactions of volatile substances with the surface of **conducting polymer sensors** is described. Some measurement results are given.

L20 ANSWER 120 OF 232 CA COPYRIGHT 2002 ACS
AN 125:291909 CA
TI A sense of (electronic) **smell**
AU Mills, Graham; Walsh, Frank; Whyte, Ian
CS School Chemistry, Physics, Radiography, University Portsmouth, Portsmouth, UK
SO Chem. Technol. Eur. (1996), 3(4), 26-30
AB A review with 28 refs. on the development of electronic **odor** and gas **sensors**, describing the principle of detection, the **sensing** systems (including the **conducting polymers**, such as **polyaniline**, **polypyrrole**, and **polythiophene**, and metal oxides), data anal., and applications.

L20 ANSWER 122 OF 232 CA COPYRIGHT 2002 ACS
AN 125:203458 CA
TI Fugitive emissions **sensor**
IN Miller, Leroy J.; Van Ast, Camille I.; Yamagishi, Frederick G.
PA Hughes Aircraft Company, USA
SO Eur. Pat. Appl., 13 pp.
PI EP 726459 A1 19960814 EP 1995-101885 19950211
AB A **sensor** for **detecting** volatile hydrocarbons and other solvent vapors detects leaks in the fittings and valves of petroleum refineries and chem. manufg. and processing plants. The **sensor** comprises a dielec. substrate having a major surface; a pair of interdigitated, **elec. conductive** electrodes disposed on the major surface of the substrate; and a composite coating covering the interdigitated electrodes. The coating comprises a **conductive polymer**, and a dielec. polymer with an affinity for the solvent vapors to be detected.

L20 ANSWER 123 OF 232 CA COPYRIGHT 2002 ACS
AN 125:130973 CA
TI Design of a silicon microsensor array device for gas analysis
AU Udrea, Florin; Gardner, Julian W.
CS Department Engineering, University Warwick, Coventry, CV4 7AL, UK
SO Microelectron. J. (1996), 27(6), 449-457
AB This paper describes the design of a silicon-based microsensor array for application in gas or **odor** monitoring. Individual **sensor** cells consist of both lateral and vertical electrode pairs to measure film conductance and/or capacitance. The fabrication process involves std. silicon technologies to integrate a platinum or nickel-iron heater below the **sensor** cells. A simulation of the device gives a thermal response time of only 60 ms and an ultra low power loss of ~50 mW at 400° per **sensor**. This compares well with exptl. values obsd. on a similar device. The process technol. is suitable for both the deposition of org. materials (e.g. **conducting polymers**) and inorg. materials (e.g. semiconducting oxides). A scheme of the transducer interface circuitry is also provided, and could be used in a portable battery-powered instrument.

L20 ANSWER 124 OF 232 CA COPYRIGHT 2002 ACS
AN 125:88446 CA
TI Vacuum-deposited semiconducting **polyaniline** thin film gas **sensors**
AU Misra, S.C.K.; Chandra, Subhas; Parihar, Manju; Vadhera, S.R.; Kumar, N.; Rao, V.K.
CS National Physical Laboratory, New Delhi, India
SO Proc. SPIE-Int. Soc. Opt. Eng. (1996), 2733(Semiconductor Devices), 223-225
AB The **elec. cond.**, optical absorption, and elec. capacitance of the metal-**polyaniline** interface is strongly influenced by the presence of gas mols. These results have led to development of gas **sensors** for use in **semiconductor** industry, environment monitoring, coal mines and other industries, where a continuous and in-situ monitoring of the working environment with respect to presence of gases is required. The **polyaniline** thin film based gas **sensors** are inexpensive, and are operated at room temp., thus have the advantage of remote positioning and monitoring at hazardous places. The authors hereby report the effect of gases on the elec. current-voltage characteristics of vacuum-deposited semiconducting **polyaniline** thin films.

L20 ANSWER 125 OF 232 CA COPYRIGHT 2002 ACS
AN 125:87936 CA
TI Study of Au(I)-**polypyrrole** interaction
AU Rau, Jong-Ru; Lee, Jeng-Cheng; Chen, Show-Chuen
CS Department of Chemistry, Fu-Jen University, Hsinchuang, 242, Taipei, Taiwan
SO Synth. Met. (1996), 79(1), 69-74
AB Metal-deposited **polypyrrole** (Ppy) exhibiting traits of enhanced conductivities and catalysis has aroused interest in the investigation of metal-Ppy interaction. Recently, a Ppy-based NO -x **sensor** was interfered with by metal ions such as Ag(I), Cu(II) and Pb(II), hinting at a strong interaction between cations and Ppy. Au(I) was chosen for study because of its possible stronger affinity to Ppy. Results from NMR, cyclic voltammetry, and a SEM/energy-dispersive spectroscopy study suggested the existence of the Au(I)-Ppy complex.

L20 ANSWER 126 OF 232 CA COPYRIGHT 2002 ACS
AN 125:70116 CA
TI Probe beam deflection study of cupric hexacyanoferrate colloid doped **polypyrrole** film modified electrode in different electrolytes
AU Liu, Changwei; Cheng, Guangjin; Li, Jinghong; Jin, Juguang; Dong, Shaojun

CS Laboratory of Electroanalytical Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, Jilin, 130022, Peop. Rep. China
SO J. Electroanal. Chem. (1996), 407(1-2), 243-246
AB **Electroactive** cupric hexacyanoferrate colloid (as a dopant anion) is immobilized in the **polypyrrole** (PPy) matrix. Probe beam deflection (PBD) combined with cyclic voltammetry (CV) techniques is a powerful tool for **detecting** the ion exchange mechanism of this film. The ion exchange accompanied by the redox dopant anions is conserved by intake/expulsion of electrolyte cations as NH4+ and K+, whereas Na+ and Li+ ions cannot enter the film freely. At the same potential range, the partial overoxidn. of PPY film is followed by intake/expulsion of electrolyte anions to maintain its electroneutrality.

L20 ANSWER 130 OF 232 CA COPYRIGHT 2002 ACS
AN 125:25314 CA
TI **Odor sensor**
IN Gibson, Timothy David; Puttick, Peter; Hulbert, John Neal; Marshall, Robert Wilson; Li, Zhuoshu
PA Mastiff Electronic Systems Ltd, UK
SO PCT Int. Appl., 34 pp.

| | | | | |
|---|---|---|---|---|
| PI | WO 9607901 | A1 | 19960314 | WO 1995-GB2117 19950906 |
| | US 5928609 | A | 19990727 | US 1997-793957 19970714 |
| PRAI | GB 1994-17913 | | 19940906 | |

AB A personnel recognition **sensor** comprises a multiplicity of differentially responding chemo-resistor elements, each element comprising a nonconductive substrate, a plurality of electrodes disposed on the substrate and one or more layers of a **conductive polymer** overlaying the electrodes, the **conductive polymers** of at least two of the elements being different; a **detector** responsive to signals provided by the multiplicity of elements and arranged to provide an output signal characteristic of the multiplicity of signals; the elements being disposed in a housing having an inlet arranged so that a gaseous sample passing into or through the inlet contacts all of the elements in use.

L20 ANSWER 131 OF 232 CA COPYRIGHT 2002 ACS
AN 125:12115 CA
TI Electrical properties of filled polymers and some examples of their applications
AU Klason, Carl; McQueen, Douglas H.; Kubat, Josef
CS Dep. Polymeric Mater., Chalmers Univ. Technol., Goeteborg, S-41296, Swed.
SO Macromol. Symp. (1996), 108(Eurofillers 95), 247-260
AB A review with 23 refs.; **polymers** contg. **elec. conductive** fillers show interesting elec. properties, like **semiconductors** and metals, without losing the processability of polymers. Typical applications are as antistatic (electrostatic dissipation) materials, electro-magnetic interference shielding materials, heaters and **sensors**. The selection of filler and polymer governs the properties obtained in such composites.

L20 ANSWER 132 OF 232 CA COPYRIGHT 2002 ACS
AN 124:341210 CA
TI **Odor** evaluation of foods using **conducting polymer** arrays and neural net pattern recognition
AU Persaud, Krishna C.; Qutob, Ahmad A.; Travers, Paul; Pisanelli, Anna Maria; Szyszko, Stefan
CS Department Instrumentation and Analytical Science, UMIST, Manchester, M60 1QD, UK
SO Olfaction Taste XI, Proc. Int. Symp., 11th (1994), Meeting Date 1993, 708-

10. Editor(s): Kurihara, Kenzo; Suzuki, Noriyo; Ogawa, Hisashi. Publisher: Springer, Tokyo, Japan.

AB An **odor-sensing** system mimicking biol. olfaction was developed. A **conductive polymer sensor** array, consisting of 20 **conducting polymer sensing** elements was coupled with a neural network-based pattern recognition system and used to asses the **odor** of raw food materials, such as corn and green coffee beans. The constructed system allowed a rapid objective assessment of **odor** quality compared to that achieved by using instrumental methods. The system may be useful for preliminary screening of food raw materials.

L20 ANSWER 136 OF 232 CA COPYRIGHT 2002 ACS
AN 124:115665 CA
TI Transient signal modeling for fast **odor** classification
AU Moy, L.; Vasic, G.; Berdague, J. L.; Rossi, V.
CS Alpha MOS, Toulouse, 31400, Fr.
SO Colloq. - Inst. Natl. Rech. Agron. (1995), 75(Bioflavour 95), 55-8
AB The Fox 2000 is an electronic **nose** system using an array of 6, 12, or 18 gas **sensors**. The anal. of **sensor** signals coming from a combination of metal oxide **sensors** and **conducting polymer** elements indicates the ability of predicting in only a few seconds the nature of a sample (hams, sausages, cereals...) from its olfactory fingerprint. The simulation of the signals is performed via exponential functions and applied to various foodstuffs. Online and real time Artificial Neural Network (ANN) have also been investigated for fast **odor** classification and recognition. Six different brands of sausages (pure pork, beef/pork sausages) have been analyzed using a 6-element array. Six samples of each type of sausage were measured 12 times and discriminant anal. was performed over the set of 72 samples using the raw data of acquisition. 94% Of the samples were correctly classified and cross validation (testing unknown samples) gave an overall success rate of 83% correctly classified samples. These results indicate the possibility to use electronic **noses** and pattern recognition methods for fast **odor** classifications.

L20 ANSWER 137 OF 232 CA COPYRIGHT 2002 ACS
AN 124:89158 CA
TI Application of **conducting polymer** technology in microsystems
AU Gardner, Julian W.; Bartlett, Philip N.
CS Department of Engineering, University of Warwick, Coventry, CV4 7AL, UK
SO Sens. Actuators, A (1995), A51(1), 57-66
AB A review, with 24 refs., is given on characteristics and applications of **conducting polymers** in micro-systems and microelectronics. Thin films of **poly(pyrrole)**/decane-sulfonate with low friction coeff. and low wear rate (ca. 1 nm/cm), similar to PTFE, yet with relatively high elec. cond. and thermal cond., are described. Electrodeposition of **conducting polymers** onto planar or curved micromech. structures, such as micro-slideways, micromotors or microturbines is described. Use of **conducting polymers** as gas-sensitive film in **sensors**, electronic **noses**, and integrated micro-systems of custom micro-**sensor** array devices and application-specific integrated circuit chips are also discussed.

L20 ANSWER 138 OF 232 CA COPYRIGHT 2002 ACS
AN 124:85167 CA
TI Online differentiation of mushrooms **aromas** by combined headspace/multi-**odor** gas **sensors** devices
AU Breheret, S.; Talou, T.; Bourrounet, B.; Gaset, A.
CS Agro-industrial Chemistry Laboratory, National Polytechnic Institute of Toulouse, Toulouse, 31077, Fr.

SO Colloq. - Inst. Natl. Rech. Agron. (1995), 75(Bioflavour 95), 103-7
AB A specially designed measurement cell for direct headspace anal., online connected to (i) a gas chromatograph equipped with an headspace injector and a sniffing-port, (ii) multisensors devices: five semiconductor gas **sensors** and twenty **conducting polymer** gas **sensors**, was used to discriminate nine mushrooms' **aromas**. The raw data of gas **sensors** were statistically processed, and provided pictorial presentation under sample distribution in a plan, allowing to compare the different mushrooms' **aromas**, with the GC/sniffing anal. Semiconductor gas **sensors** succeeded in classifying four groups based on overall **odor**. Semiconductor gas **sensors** seem to be more appropriate for the mushrooms **aromas** discrimination than **conducting polymer** gas **sensors**. These preliminary results confirm the interest of such technologies for chemotaxonomy differentiation of wild mushrooms.

L20 ANSWER 140 OF 232 CA COPYRIGHT 2002 ACS
AN 123:305599 CA
TI Gas **sensor** assembly and method of fabrication thereof
IN McInnes, James
PA Neotronics Ltd., UK
SO PCT Int. Appl., 17 pp.
PI WO 9523964 A1 19950908 WO 1995-GB462 19950303
PRAI GB 1994-4090 19940303
AB There is described a method of fabricating a gas **sensor** assembly, particularly for **sensing smells** and **aromas**, the assembly comprising a board, a pair of conductive tracks on the board, a substrate on the board, a pair of spaced-apart contacts supported on the substrate, and a semi-**conductive polymer** spanning the gap between the contacts, which polymer is capable of interreacting with gases and/or volatile material to change its resistance, which method comprises: (1) mounting the substrate on the board, the substrate comprising the said pair of spaced-apart contacts and a protective layer covering the contacts except for: (a) a region of each contact allowing elec. connection to be made to the contacts and (b) a region spanning the gap between the contacts corresponding to the location of the polymer, so that the elec. connection regions lie adjacent to the said conductive tracks; (2) connecting the pair of conductive tracks to the connection regions of the resp. pair of elec. contacts by elec. connections; (3) submerging substantially the whole of the substrate in a monomer soln.; and (4) applying a potential to the contacts to cause the monomer to polymerize in the said region of the substrate spanning the gap. Such an arrangement allows the polymer to be grown consistently while at the same time reducing the resistance of the contacts reducing their length.

L20 ANSWER 141 OF 232 CA COPYRIGHT 2002 ACS
AN 123:283915 CA
TI Potential applications for an electronic **aroma detector** within the brewing industry
AU Taylor, M.; Bailey, T.; Hammond, R.; Merry, G.
CS Electra House, AromaScan plc, Electra Way/Crewe, CW1 1WZ, UK
SO Tech. Q. - Master Brew. Assoc. Am. (1995), 32(3), 175-9
AB An AromaScan electronic **aroma detector**, of the "OdourMapper" type, has been installed at BRF International to est. its potential for the brewing industry. The technol. is based on a **sensor** array of semi-**conducting polymers**, mounted on a microprocessor. Interaction with volatile chems. results in characteristic patterns of resistance changes across the **sensor** array. **Aroma** patterns are differentiated using cluster anal., or neural network pattern recognition software, permitting real time pattern recognition. A study was conducted to det. the instrument's ability to

differentiate between varieties of hops. It has the potential for screening raw materials on delivery for trueness-to-type. A second investigation was carried out to monitor fermenter headspace **aroma** during fermn. and maturation of premium lager. Online, the instrument should be able to identify changes for a desired specification. The ability to recognize or differentiate between a characterized sample and an unknown, provides opportunities for potential applications in quality assurance, quality control and process monitoring within the brewing industry.

L20 ANSWER 143 OF 232 CA COPYRIGHT 2002 ACS
AN 123:187361 CA
TI A new generation of integrated electronic **noses**
AU Neaves, P. I.; Hatfield, J. V.
CS Department of Electrical Engineering and Electronics, UMIST, PO Box 88, Manchester, M60 1QD, UK
SO Sens. Actuators, B (1995), B27(1-3), 223-31
AB At Eurosensors VII the authors discussed the feasibility of integrating the UMIST artificial electronic **nose**. A tentative **sensor** deposition technique is reported along with the development of an application specific integrated circuit (ASIC) to perform the analog signal processing. The following paper reports further progress in achieving this goal. The integrated **nose** employs two ASICs; a current multiplexer and a current amplifier. Current-mode signal processing was used where appropriate. Arrays of **conducting** org. **polymers** were successfully fabricated. Results are presented on the dynamics, reproducibility and matching of the **sensing** elements.

L20 ANSWER 150 OF 232 CA COPYRIGHT 2002 ACS
AN 123:39706 CA
TI The development of an electronic '**nose**' for industrial and environmental applications
AU Hodgins, Diana
CS Neotronics Limited, Parsonage Road, Takeley near Bishops Stortford Herts., CM22 6PU, UK
SO Sens. Actuators, B (1995), B27(1-3), 255-8
AB The described electronic **nose** deals entirely with a **conducting polymer sensor** system which works on the principle of 12 different **sensors** monitoring a complex vapor in the headspace above a sample. The ability of any system to mimic the human **nose** depends primarily on **sensor** characteristics; therefore, most of the development work has been on **sensor** materials and the fabrication process. The range of **sensors** described exhibits significantly different responses to most vapors tested. Using 12 of these **sensors**, a very good discrimination was achieved between very similar samples over a wide range of products. The complete system is easy to use in the lab., and software was developed to enable the complex data to be analyzed and presented in a simple summary form.

L20 ANSWER 151 OF 232 CA COPYRIGHT 2002 ACS
AN 122:305562 CA
TI Methods and devices for the detection of odorous substances and applications
IN Mifsud, Jean Christophe; Moy, Laurent
PA Alpha M.O.S, Fr.
SO PCT Int. Appl., 33 pp.

| | | | | | |
|---|---|---|---|---|---|
| PI | WO 9508113 | A1 | 19950323 | WO 1994-FR1085 | 19940916 |
| | US 5801297 | A | 19980901 | US 1996-615308 | 19960315 |
| | US 5918257 | A | 19990629 | US 1998-10705 | 19980122 |
| PRAI | FR 1993-11291 | | 19930917 | | |

AB Device for carrying out a method of **odor** detection comprising, in particular, a plurality of chambers, each including a plurality of semi-conductor gas **sensors**, **conductive polymer** gas **sensors**, surface acoustic wave gas **sensors**, as detection means, a variable flow gas pump for forming a gas flow in said chambers, measurement elec. device for operating the detection means, a data processing unit for recording in a file the olfactory prints obtained using the detection means, and for comparing the detected impressions with those in the file so that **odors** may be identified and recognized. Applications, esp. to drugs, explosives, body **odors** and food seals.

L20 ANSWER 155 OF 232 CA COPYRIGHT 2002 ACS
AN 122:158916 CA
TI Applications for an electronic **aroma detector** in the analysis of beer and raw materials
AU Bailey, Timothy P.; Hammond, Roger V.; Persaud, Krishna C.
CS BRF International, Nutfield, Surrey, RH1 4HY, UK
SO J. Am. Soc. Brew. Chem. (1995), 53(1), 39-42
AB A prototype electronic **aroma detector** (Odourmapper) has been developed by the University of Manchester Institute of Science and Technol. and is undergoing trials at BRF International. The trials are being conducted to det. its ability to differentiate between beers and to recognize the presence of important beer **aromas** and varietal/quality parameters of malt and hops. Purified air displaces the headspace above a sample, which passes over an array of **conducting polymers** mounted on an electronic chip. The change in cond. of the **sensors** at the interface with mols. present in the vapor flow is measured as a voltage. The responses from these polymers are rapid and reversible at room temp. The change of resistance of each polymer is displayed in real time on a personal computer, which stores data. The software includes a neural network pattern recognition program with which, after appropriate training, differentiation between control beers and beers spiked with hydrogen sulfide, di-Me sulfide, or diacetyl has been achieved. There is promise for some hop varietal differentiation. Further development will be required to utilize these findings com., but there are many potential uses for quality assurance.

L20 ANSWER 156 OF 232 CA COPYRIGHT 2002 ACS
AN 122:82825 CA
TI Continuous, single-component, crystalline networks in polymer matrix and their vapor doping
AU Jeszka, Jeremiasz
CS Cent. Mol. Macromol. Stud., Pol. Acad. Sci., Lodz, 90-363, Pol.
SO Polym. Adv. Technol. (1994), 5(4), 236-9
AB Single-component continuous networks of a low mol. wt. electron acceptor additive can be grown in a polymer matrix. Such networks can be doped using, e.g., I2 vapor and converted to conductive **charge transfer complexes** without losing continuity, thereby making the **polymer** film **conductive**. Polyethylene films with tetrathiotetracene networks are obtained, and their doping with I2 vapor in air is investigated by means of cond. and spectrophotometry in the visible range. Doping of the surface layer of the microcrystallites is sufficient to observe a significant increase in the film cond., thus, these systems may be used as **sensors**.

L20 ANSWER 163 OF 232 CA COPYRIGHT 2002 ACS
AN 121:33745 CA
TI A multisensor system for beer flavor monitoring using an array of **conducting polymers** and predictive classifiers
AU Gardner, Julian W.; Pearce, Timothy C.; Friel, Sharon; Bartlett, Philip N.;

Blair, Neil
CS Department of Engineering, University of Warwick, Coventry, CV4 7AL, UK
SO Sens. Actuators, B (1994), 18(1-3), 240-3
AB This paper describes the results of a 3-yr project, jointly funded by the UK government and industry, to develop a multisensor system capable of discriminating between the **aromas** of different beers. The system consists of an array of up to 24 **conducting polymer sensors** (thin films electrodeposited onto a microelectrode structure). The **conducting polymers** provide the active layer in these conductometric **odor sensors** and respond differentially to the headspaces of beers and lagers. The interface circuitry and signal conditioning were designed and realized in custom PCBs housed in a Eurorack-based multisensor system. A comprehensive suite of software modules was developed to automate the sampling system and process the **sensor** array data. The output from the polymer array is pre-processed using a variety of algorithms (e.g., fractional change in conductance, normalized relative response) and then classified using a statistical (chemometric fingerprinting technique) or neural predictive classifier (multi-layer perceptron using back-propagation learning). The **odor-sensing** system can distinguish subtle taints, e.g., 0.5 ppm of diacetyl in an ethanol soln. with only nine different varieties of **conducting polymers**.

L20 ANSWER 166 OF 232 CA COPYRIGHT 2002 ACS
AN 121:24674 CA
TI **Electrically conductive** coating composition for providing a bend **sensor**
IN Margolin, Keith J.
PA National Starch and Chemical Investment Holding Corp., USA
SO U.S., 5 pp.

| | | | | | |
|---|---|---|---|---|---|
| PI | US 5250227 | A | 19931005 | US 1990-518343 | 19900503 |
| | US 5411789 | A | 19950502 | US 1992-846268 | 19920226 |
| PRAI | US 1990-518343 | | 19900503 | | |

AB A compn. is described which forms a bend **sensor** when coated on a flexible substrate. The compn. contains a brittle binder which cracks under a stress, **elec. conductive** elements, and a **graphite** additive which stabilizes the degree of cracking. The compn. forms a bend **sensor** which upon a change in degree of flexing produces an elec. signal in the form of a change in resistance in circuits which include the **sensor**.

L20 ANSWER 168 OF 232 CA COPYRIGHT 2002 ACS
AN 120:326282 CA
TI Towards an integrated electronic **nose** using **conducting polymer sensors**
AU Hatfield, J. V.; Neaves, P.; Hicks, P. J.; Persaud, K.; Travers, P.
CS Department of Electrical Engineering and Electronics and, Manchester, M60 1QD, UK
SO Sens. Actuators, B (1994), 18(1-3), 221-8
AB The progress that has been made towards realizing an artificial **nose** based on arrays of **conducting polymers** is described. Elec. **conducting** org. **polymers** based on heterocyclic mols. display reversible changes in cond. when exposed to polar volatile chems. In the **sensor** described, the polymers are interrogated for resistance changes by means of an application-specific integrated circuit (ASIC) realized in BiCMOS technol. The ASIC and the polymer array are housed on a single thick-film ceramic substrate.

L20 ANSWER 179 OF 232 CA COPYRIGHT 2002 ACS
AN 116:227243 CA
TI Combination of semiconductor **sensors** and polymers for detection of gases
IN Rump, Hanns; Kohl, Claus Dieter
PA Elektronik und Technologie Rump G.m.b.H. (ETR), Germany

SO Ger. Offen., 2 pp. Addn. to Ger. Offen. 3,934,532.
PI DE 4010493 A1 19911002 DE 1990-4010493 19900331
US 5217692 A 19930608 US 1991-689857 19910610
PRAI DE 1989-3934532 19891017
AB This combination, as described in 3934532.7, is modified, where this gas-detection **sensor**, having a metal oxide **sensor** element as well as requiring other **sensor** elements, is elec. connected to an array in addn. to evaluation electronics for evaluating the signals given off from the **sensors**. The org. semiconductor material can be **polypyrrole**, polyazulene, polycarbazole, porphyrin, polyphenyl-acetylene, polyimidazole, polyamides, and polyimides.

L20 ANSWER 196 OF 232 CA COPYRIGHT 2002 ACS
AN 113:124693 CA
TI **Electrically conductive** polyparaphenylenes, and methods for their preparation and use
IN Pons, B. Stanley
PA University of Utah, USA
SO U.S., 16 pp.
PI US 4911801 A 19900327 US 1985-782968 19851001
AB **Elec. conductive** polyparaphenylene compns. are disclosed, as well as methods for their prepn. and use, including use of the polymers in constructing a **sensor**. The polymer compns. are both soln.-processable and **elec. conductive**. The polymers are produced by placing a metal electrode in an aprotic soln. of biphenyl. Current is then passed through the electrode such that the electrode becomes the anode and such that the biphenyl polymerizes and is deposited on the electrode. A **sensor** is produced by incorporating a **sensor** species into polyparaphenylene; this can be accomplished by polymg. the biphenyl in the presence of the **sensor** species.

L20 ANSWER 198 OF 232 CA COPYRIGHT 2002 ACS
AN 113:31035 CA
TI The use of microelectrodes as substrates for chemically modified **sensors**. A comparison with conventionally sized electrodes
AU John, R.; Wallace, G. G.
CS Chem. Dep., Univ. Wollongong, Wollongong, 2500, Australia
SO J. Electroanal. Chem. Interfacial Electrochem. (1990), 283(1-2), 87-98
AB The electrosynthesis of **conducting polymers** on microelectrodes has been investigated in this work. It has been shown that the incorporation of reagents suitable for anal. purposes is more readily achieved on microelectrodes than on macroelectrodes. Advantages in the anal. procedures employed using modified microelectrodes were also obsd. Electrosynthesis without deliberate addn. of supporting electrolyte has been demonstrated and the use of these electrodes for anal. without supporting electrolyte has also been considered.

L20 ANSWER 199 OF 232 CA COPYRIGHT 2002 ACS
AN 112:244299 CA
TI **Electrically conductive polymer** compositions, their preparation, and their use
IN Becker, Richard; Bloechl, Georg; Braeunling, Hermann
PA Wacker-Chemie G.m.b.H., Fed. Rep. Ger.
SO Eur. Pat. Appl., 14 pp.
PI EP 357059 A2 19900307 EP 1989-116043 19890831
PRAI DE 1988-3829753 19880901
AB The compns., contg. poly(hetero)arylenemethynes and/or their salts, also contain ≥1 addnl. polymer. The compns. can be used as **elec. conductors** and

**semiconductors**, electrochem. **sensors**, or materials for elec. shields.

L20 ANSWER 202 OF 232 CA COPYRIGHT 2002 ACS
AN 111:224461 CA
TI Gas **sensor** and its manufacture
IN Yamaguchi, Hideichiro; Shimomura, Takeshi; Koyama, Noboru
PA Terumo Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 13 pp.
PI JP 01013449 A2 19890118 JP 1987-167930 19870707
AB The gas **sensor** dets. gas concn. or its partial pressure by detg. current changes due to electrolytic redn. reaction, and comprises (1) an **elec. conductive** substrate, (2) an **elec. conductive polymer** layer on the substrate, and (3) a catalyst layer, which on the polymer layer, induces a redn. reaction with a gas. Optionally, an auxiliary catalyst layer may be used between (2) and (3). The manuf. is also claimed.

L20 ANSWER 211 OF 232 CA COPYRIGHT 2002 ACS
AN 108:57330 CA
TI Electronically **conducting polymer** gas **sensors**
AU Miasik, J. J.; Hooper, A.; Moseley, P. T.; Tofield, B. C.
CS Harwell Lab., United Kingdom At. Energy Auth., Oxfordshire, OX11 0RA, UK
SO Conduct. Polym., Proc. Workshop (1987), Meeting Date 1986, 189-98. Editor(s): Alcacer, Luis. Publisher: Reidel, Dordrecht, Neth.
AB Devices were fabricated using **elec. conducting polymers** for the ambient temp. detection of several industrially important gases. The resistance of thin **polypyrrole** films increased in the presence of 0.1% NH3 in air and decreased in the presence of 0.1% NO2 and 0.1% H2S. Devices based on **conducting polymers** offer advantages in environmental monitoring over presently available **semiconductor sensors** which generally operate at elevated temps.

*L20 ANSWER 220 OF 232* CA COPYRIGHT 2002 ACS
AN 105:215596 CA
TI Chemically responsive microelectrochemical devices based on platinized **poly**(3-**methylthiophene**): variation in conductivity with variation in hydrogen, oxygen, or pH in aqueous solution
AU Thackeray, James W.; Wrighton, Mark S.
CS Dep. Chem., Massachusetts Inst. Technol., Cambridge, MA, 02139, USA
SO J. Phys. Chem. (1986), 90(25), 6674-9
AB ,Ocrpe. Microelectrochem transistors can be prepd. by connecting 2 closely spaced (approx. 1.2 μm) Au microelectrodes (0.1 μm thick × 2.4 μm wide × 50 μm long) with anodically grown **poly**(3-**methylthiophene**). The amt. of **poly**(3-**methylthiophene**) used involves about 10-7-10-6 mol of monomer/cm2. **Poly**(3-**methylthiophene**) can be platinized by electrochem. redn. of PtCl42- at the pair of coated electrodes. The change in cond. of **poly**(3-**methylthiophene**) with change in redox potential is the basis for amplification of elec. or chem. signals; the cond. varies by 5-6 orders of magnitude upon change in potential from +0.2 (insulating) to +0.7 (conducting) V vs. SCE in aq. electrolyte. The Pt equilibrates **poly**(3-**methylthiophene**) with the O/H2O or H2O/H redox couples. [**Poly**(3-**methylthiophene**)/Pt]-based transistors are shown to be viable room-temp. **sensors** for O and Hin aq. soln. The O reproducibly turns on the device, with 1 atm O/0.1 M HClO40H2O showing 0.7-mA ID at a VD = 0.2 V; H reproducibly turns off the device, with 1 atm of H/0.1 M HClO4/H2O showing less than 20-nA ID at a VD = 0.2 V, where VD (drain potential) is the applied potential between the 2 Au microelectrodes and ID (drain current) is the current that passes between the 2 microelectrodes. The turn on with O is complete within 2 min, and the turn off with H is complete within 0.3

min. A platinized microelectrode of a dimension similar to the microelectrochem. transistor shows only 1.0-nA redn. current upon exposure to 1 atm of O; the current amplification of the transistor is thus a factor greater than 105. The transistor device can also reproducibly respond to pH changes in the pH range of 0-12, when there is a const. O concn.; there is a reproducible change in ID to alternate flow of a pH 5.5/pH 6.5 stream for over 10 h. The device responds to an injection of 10-6 L of 0.1 M HClO4 into an effluent stream of 0.1 M NaClO4 (flowing at 2 mL/min) within 4s. Study of the resistance properties of [**poly**(3-**methylthiophene**)/Pt] vs potential reveals that Pt has little effect on the intrinsic cond. of **poly**(3-**methylthiophene**). Rather, the role fo Pt is purely a a catalyst to allow equilibration of O and H with the polymer. The amt. of Pt used in approx. 10-7 mol/cm2, and microscopy shows Pt to be present as particle of less than 0.1-$\mu$m size.

***L20 ANSWER 222 OF 232*** CA COPYRIGHT 2002 ACS
AN 105:122971 CA
TI Dispersive x-ray spectroscopy for time-resolved in situ observation of electrochemical inclusion of metallic clusters within a **conducting polymer**
AU Tourillon, G.; Dartyge, E.; Fontaine, A.; Jucha, A.
CS Lab. Util. Rayonnement Electromagn., Cent. Natl. Rech. Sci., Orsay, 91405, Fr.
SO Phys. Rev. Lett. (1986), 57(5), 603-6
AB Electrochem. synthesized **polythiophene** is a very promising **conducting polymer** able to support any metallic particles which could be useful in various applications (e.g., conducting leads, catalysis). Time-resolved in situ investigation of the process of the inclusion of metallic aggregates was achieved by dispersive x-ray absorption spectroscopy. The unique capability of this new structural tool comes from the assocn. of the properties of synchrotron radiation with a photodiode array used as a position-sensitive **detector**.

L20 ANSWER 223 OF 232 CA COPYRIGHT 2002 ACS
AN 105:120674 CA
TI An approach to an artificial **nose**
AU Persaud, K. C.; Pelosi, P.
CS Dep. Physiol. Biophys., Med. Coll. Virginia, Richmond, VA, USA
SO Trans. - Am. Soc. Artif. Intern. Organs (1985), 31, 297-300
AB **Polypyrrole** (I) [**30604-81-0**], poly(2-chloroaniline) (II) [**98038-21-2**], **poly**(**thiophene**-2-acetonitrile) (III) [**102610-75-3**], polyindole (IV) [82451-55-6] and poly(2-isobutylthiazole) (V) [104166-90-7] showed potential for being suitable **odor** transducers in the content of an artificial **nose**. The elec. response of the polymers to different **odors** was tabulated. On exposure to NH3 II and IV **sensors** showed a decrease in resistance while I, III, and V showed increased resistance. Possible uses of the devices for monitoring specific gases and **odors** and gas chromatog. **detectors** were discussed.

L20 ANSWER 224 OF 232 CA COPYRIGHT 2002 ACS
AN 104:236526 CA
TI Gas **sensors**
IN Persaud, Krishna Chandra; Pelosi, Paolo
PA Cogent Ltd., UK
SO PCT Int. Appl., 29 pp.
PI WO 8601599 A1 19860313 WO 1985-GB373 19850820
PRAI GB 1984-21188 19840821
AB A **sensor** for gases, vapors, or **odors** has an org. polymeric semiconductor element which changes its elec. resistance in the presence of certain

gases. The polymer is formed by electrolytic deposition on the substrate from a soln. of its monomer, the soln. comprising a solvent medium in which the monomer is sparingly sol., a protic solvent, and an ionic base. A no. of different gas **detectors** can be used to obtain from each a characteristic response to the presence of a gas, and the combination of responses can be used to distinguish between gases. The different **detectors** may be all based upon org. polymers, or one or more **detectors** may use other principles such as flame ionization or gas chromatog. The **sensor** is useful in monitoring industrial environments, gas liq. chromatog., quality control in food and drinks prodn., and food prodn.

L20 ANSWER 230 OF 232 CA COPYRIGHT 2002 ACS
AN 94:149187 CA
TI Doped **acetylene polymer**
IN Matsumura, Yoshio; Nozue, Ikuo; Ukachi, Takashi
PA Japan Synthetic Rubber Co., Ltd., Japan
SO Eur. Pat. Appl., 22 pp.

| | | | | | |
|---|---|---|---|---|---|
| PI | EP 22271 | A1 | 19810114 | EP 1980-103857 | 19800707 |
| | US 4349664 | A | 19820914 | US 1980-166995 | 19800709 |
| PRAI | JP 1979-86402 | | 19790710 | | |

AB Doped **acetylene polymers** useful as org. **semiconductors** for solar batteries, various **sensors**, etc. were produced by immersing an **acetylene polymer** under an inert gas atm. in an org. solvent soln. of a dopant (a Pt group metal complex, a carbonium salt, an oxonium salt, or a p-benzoquinone deriv.). A doped **acetylene polymer** having any desired **elec. cond.** was produced.

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